

Amendments to the Claims:

This listing of claims will replace all prior versions and listing of claims in the application.

Listing of Claims:

1-42. (Canceled)

43. (Previously Presented) A data relocation method in a computer system comprising:

at least one computer for operating a database management system;

at least one storage apparatus for storing database data to be managed by said database management system, said storage apparatus including a plurality of physical storage devices;

storage control means connected between said computer and said storage apparatus, for controlling transfer of database data between said computer and said storage apparatus; and

a data position management server for managing positions of database data in said computer system, said method comprising the steps of:

acquiring, by said data position management server, information a database to be managed by said database management system through said computer, said information on the database including table data and index data to said table data, with said index data having a tree-structure;

determining, by said data position management server, relocation of database data in said computer system on the basis of the information on the database thus acquired;

instructing, from said data position management server, said storage control means to migrate database data so as to prevent said storage control means from accessing said table data and said index data simultaneously in a same physical storage device; and

changing, by said storage control means, allocation of database data so that said table data and said index data are stored in different physical storage devices, respectively, according to instruction from said data position management server.

44. (Previously Presented) A data relocation method in a computer system comprising:

at least one computer for operating a database management system;

at least one storage apparatus for storing database data to be managed by said database management system, said storage apparatus including a plurality of physical storage devices;

storage control means connected between said computer and said storage apparatus, for controlling transfer of database data between said computer and said storage apparatus; and

a data position management server for managing positions of database data in said computer system, said method comprising the steps of:

acquiring, by said data position management server, information on a database to be managed by said database management system through said computer, said information on the database including log data and database data other than said log data;

determining, by said data position management server, relocation of database data in said computer system on the basis of the information on the database thus acquired;

instructing, from said data position management server, said storage control means to migrate database data so as to prevent said storage control means from accessing said log data and said database data other than said log data simultaneously in a same physical storage device; and

changing, by said storage control means, allocation of database data so that said log data and said database data other than said log data are stored in different physical storage devices, respectively, according to instruction from said data position management server.

45. (Previously Presented) A computer system comprising:

at least one computer for operating a database management system;

at least one storage apparatus for storing database data to be managed by said database management system, said storage apparatus including a plurality of physical storage devices;

a storage controller connected between said computer and said storage apparatus, for controlling transfer of database data between said computer and said storage apparatus; and

a data position management server for managing positions of database data in said computer system,

wherein said data position management server includes:

an information acquisition section that acquires information on a database to be managed by said database management system through said computer, said information on the database including table data and index data to said table data, with said index data having a tree-structure;

a relocation determination section that determines relocation of database data in said computer system on the basis of the information on the database thus acquired; and

a data allocation instruction section that instructs said storage controller to migrate database data so as to prevent said storage controller from accessing said table data and said index data simultaneously in a same physical storage device; and

wherein said storage controller includes a data allocation changer that changes allocation of database data so that said table data and said index data are

stored in different physical storage devices, respectively, according to instruction from said data position management server.

46. (Previously Presented) A computer system comprising:
- at least one computer for operating a database management system;
 - at least one storage apparatus for storing database data to be managed by said database management system, said storage apparatus including a plurality of physical storage devices;
 - a storage controller connected between said computer and said storage apparatus, for controlling transfer of database data between said computer and said storage apparatus; and
 - a data position management server for managing positions of database data in said computer system,
 - wherein said data position management server includes:
 - an information acquisition section that acquires information on a database to be managed by said database management system through said computer, said information on the database including log data and database data other than said log data;
 - a relocation determination section that determines relocation of database data in said computer system on the basis of the information on the database thus acquired; and

a data allocation instruction section that instructs said storage controller to migrate database data so as to prevent said storage controller from accessing said log data and database data other than said log data simultaneously in a same physical storage device, and

wherein said storage controller includes a data allocation changer that changes allocation of database data so that said log data and database data other than said log data are stored in different physical storage devices, respectively, according to instruction from said data position management server.

47. (New) A data relocation method in a computer system comprising at least one computer for operating a database management system, at least one storage apparatus for storing database data to be managed by said database management system, storage control means connected between said computer and said storage apparatus for controlling data transfer between said computer and said storage apparatus, and a data position management server for managing the data positions in said computer system, said method comprising the steps of:

acquiring information on a database to be managed by said database management system through said computer by said data position management server;

determining by said data position management server allocation of said database data in said computer system on the basis of acquisition information including said database information;

instructing said storage control means of data migration to realize said data allocation determined by said data position management server; and

changing said data allocation stored in said storage apparatus by said storage control means according to said instruction,

wherein said information on database contains at least one of information relating to a data structure including table, index, and log defined by a schema of said database management system and information relating to record positions of data of said database sorted according to the data structure defined by said schema in said storage apparatus,

wherein said storage apparatus*has at least one physical storage means for storing data therein, and said data position management server, at the time of determining said data allocation, determines a data allocation which specify a storage position in said physical storage means of said storage apparatus, wherein said data position management server has at least one physical storage means for storing data therein, said storage apparatus has logical/physical position conversion means for converting a logical position used by said computer to access said storage apparatus to a storage position of said physical storage means, and said data position management server acquires information including in-storage-apparatus logical/physical mapping information relating to mapping of logical/physical position from the storage apparatus having said logical/physical position conversion means,

wherein at least one of the storage apparatuses having said logical/physical position conversion means has in-storage-apparatus data physical storage position change means for changing a storage position of data of said physical storage means corresponding to said logical position, said data position management server, at the time of instructing data migration to realize said determined data allocation, instructs said storage apparatus having said storage-apparatus data physical storage

position change means of the data migration in said storage apparatus, and said storage apparatus changes the allocation of said data stored in said storage apparatus according to said instruction,

wherein said data position management server detects a set of said database data to be simultaneously accessed with a high possibility on the basis of said acquisition information, and arranges said set in said physical storage means different therefrom, and

wherein said data position management server acquires information including information about an execution history of operation of said database management system.

48. (New) A data relocation method in a computer system comprising at least one computer for operating a database management system, at least one storage apparatus for storing database data to be managed by said database management system, storage control means connected between said computer and said storage apparatus for controlling data transfer between said computer and said storage apparatus, and a data position management server for managing the data positions in said computer system, said method comprising the steps of:

acquiring information on a database to be managed by said database management system through said computer by said data position management server;

determining by said data position management server allocation of said database data in said computer system on the basis of acquisition information including said database information;

instructing said storage control means of data migration to realize said

data allocation determined by said data position management server; and
changing said data allocation stored in said storage apparatus by said storage control means according to said instruction,

wherein said information on database contains at least one of information relating to a data structure including table, index, and log defined by a schema of said database management system and information relating to record positions of data of said database sorted according to the data structure defined by said schema in said storage apparatus,

wherein said storage apparatus has at least one physical storage means for storing data therein, and said data position management server, at the time of determining said data allocation, determines a data allocation which specify a storage position in said physical storage means of said storage apparatus, and

wherein said database information includes information relating to a parallelism when said database management system accesses said database data belonging to the same data structure defined by said schema, and said data position management server arranges said database data belonging to the same data structure defined by said schema in a plurality of said physical storage means on the basis of said acquisition information.

49. (New) A data relocation method in a computer system comprising at least one computer for operating a database management system, at least one storage apparatus for storing database data to be managed by said database management system, storage control means connected between said computer and said storage apparatus for controlling data transfer between said computer and said storage apparatus, and a data position management server for managing the data

positions in said computer system, said method comprising the steps of:

acquiring information on a database to be managed by said database management system through said computer by said data position management server;

determining by said data position management server allocation of said database data in said computer system on the basis of acquisition information including said database information;

instructing said storage control means of data migration to realize said data allocation determined by said data position management server; and

changing said data allocation stored in said storage apparatus by said storage control means according to said instruction,

wherein said information on database contains at least one of information relating to a data structure including table, index, and log defined by a schema of said database management system and information relating to record positions of data of said database sorted according to the data structure defined by said schema in said storage apparatus,

wherein said storage apparatus has at least one physical storage means for storing data therein, and said data position management server, at the time of determining said data allocation, determines a data allocation which specify a storage position in said physical storage means of said storage apparatus, and

wherein said data position management server judges an access location and access order at the time of sequentially accessing said database data, and arranges said database data sequentially accessed in continuous areas while keeping a relationship of said continuous access order on said physical storage means.

50. (New) A computer system including at least one computer for

operating said database management system, at least one storage apparatus for storing database data to be managed by said database management system, storage control means connected between said computer and said storage apparatus for controlling data transfer between said computer and said storage apparatus, and a data position management server for managing the data positions in said computer system, said data position management server comprising:

information acquisition means for acquiring information on a database to be managed by said database management system through said computer by said data position management server;

allocation determination means for determining by said data position management server allocation of said database data in said computer system on the basis of acquisition information including said database information; and

data allocation instruction means for instructing said storage control means of data migration to realize said data allocation determined by said data position management server,

wherein said storage control means has data allocation change means for changing said data allocation stored in said storage apparatus by said storage apparatuses according to said instruction,

wherein said database information includes at least one of information on a data structure including table, index, and log defined by the schema of said database management system and information on recorded positions of said database data in said storage apparatus sorted according to the data structure defined by said schema,

wherein said storage apparatus has at least one physical storage means for storing at least one piece of data, and said allocation determination means

determines the data allocation which specify storage position in said physical storage means of said storage apparatus,

wherein said allocation determination means detects a set of said database data to be simultaneously accessed with a high possibility on the basis of said acquisition information and allocates said detected set in said physical storage means different therefrom, and

wherein said database information includes information relating to an execution history of operation of said database management system.

51. (New) A computer system including at least one computer for operating said database management system, at least one storage apparatus for storing database data to be managed by said database management system, storage control means connected between said computer and said storage apparatus for controlling data transfer between said computer and said storage apparatus, and a data position management server for managing the data positions in said computer system, said data position management server comprising:

information acquisition means for acquiring information on a database to be managed by said database management system through said computer by said data position management server;

allocation determination means for determining by said data position management server allocation of said database data in said computer system on the basis of acquisition information including said database information; and

data allocation instruction means for instructing said storage control means of data migration to realize said data allocation determined by said data position management server,

wherein said storage control means has data allocation change means for changing said data allocation stored in said storage apparatus by said storage apparatuses according to said instruction,

wherein said database information includes at least one of information on a data structure including table, index, and log defined by the schema of said database management system and information on recorded positions of said database data in said storage apparatus sorted according to the data structure defined by said schema,

wherein said storage apparatus has at least one physical storage means for storing at least one piece of data, and said allocation determination means determines the data allocation which specify storage position in said physical storage means of said storage apparatus, and

wherein said database information includes information relating to a parallelism when the database management system accesses said database data belonging to an identical data structure defined by said schema, and said allocation determination means arranges said database data belonging to the identical data structure defined by said schema in a plurality of said physical storage means on the basis of said acquisition information.

52. (New) A computer system including at least one computer for operating said database management system, at least one storage apparatus for storing database data to be managed by said database management system, storage control means connected between said computer and said storage apparatus for controlling data transfer between said computer and said storage apparatus, and a data position management server for managing the data positions

in said computer system, said data position management server comprising:

information acquisition means for acquiring information on a database to be managed by said database management system through said computer by said data position management server;

allocation determination means for determining by said data position management server allocation of said database data in said computer system on the basis of acquisition information including said database information; and

data allocation instruction means for instructing said storage control means of data migration to realize said data allocation determined by said data position management server,

wherein said storage control means has data allocation change means for changing said data allocation stored in said storage apparatus by said storage apparatuses according to said instruction,

wherein said database information includes at least one of information on a data structure including table, index, and log defined by the schema of said database management system and information on recorded positions of said database data in said storage apparatus sorted according to the data structure defined by said schema,

wherein said storage apparatus has at least one physical storage means for storing at least one piece of data, and said allocation determination means determines the data allocation which specify storage position in said physical storage means of said storage apparatus, and

wherein said allocation determination means judges an access location and an access order when said database management system sequentially accesses said database data on the basis of said acquisition information, and arranges the

Appl. No. 10/084,540
Amendment dated December 8, 2005
Reply to Office Action of July 12, 2005

ASA-1072

database data to be sequentially accessed in continuous areas while keeping a relationship of said continuous access order on said physical storage means.